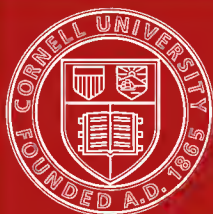


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SMITH, CHARLES H.

BRIEF GENERAL HISTORY
OF THE CENTRAL ASSOCIATION
OF SCIENCE AND MATHEMATICS TEACHERS

1913



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A BRIEF HISTORY

OF THE

CENTRAL ASSOCIATION *of* SCIENCE
AND MATHEMATICS TEACHERS



A713848
Thirteenth Annual Meeting

November 27, 28 and 29, 1913

Des Moines, Iowa

President, James F. Millis
Francis W. Parker School, Chicago

Secretary, W. L. Eikenberry
University High School, University of Chicago

Treasurer, C. E. Spicer
High School, Joliet, Illinois

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BRIEF GENERAL HISTORY OF THE CENTRAL ASSOCIATION OF SCIENCE AND MATHEMATICS TEACHERS.

BY CHARLES H. SMITH,

Hyde Park High School, Chicago.

In the spring of 1902 physics instructors from a number of schools met in Chicago to consider the organization of an association of physics teachers of the Central States. A committee of three was appointed, which after further consideration of the matter, called a meeting for the 7th of June. Twenty-five schools were represented at this general meeting, at which an association was formerly organized, a constitution adopted, and officers elected. The Thanksgiving recess and the spring vacation were selected as the times for holding meetings of the Association. Preparations for the next meeting were at once begun by the various committees with the result that the meeting held November 28th and 29th at Lewis Institute, Chicago, proved very successful as to attendance and interest.

In November of the same year at a meeting of the Mathematics Section of the Educational Conference of Academies and High Schools certain questions were considered, one, with reference to the possibility of improving mathematical instruction by the introduction of laboratory methods and the closer correlations with the other subjects of the curriculum, especially physics, and another, as to the possibility of forming an Association of Mathematics Teachers to co-operate with the Central Association of Physics Teachers. As a result, there was presented at the Thanksgiving session of the Physics Association a petition signed by the teachers of mathematics and of the high school sciences, asking that an organization of a larger association be considered, such an association to include sections of each of the sciences and mathematics. The petition was referred to the Executive Committee, and during the winter the Executive Committee and those of the petitioners most interested perfected plans to make the April meeting an organization meeting for the Central Association and to provide programs for the different sections. Mean-

while there was held on December 15 a meeting to consider more especially the question of laboratory mathematics. At that meeting the organization of the general association was perfected with biology, chemistry, earth science, mathematics, and physics sections. The constitution of the former Association was modified to meet the needs of the larger organization. The general officers of the Physics Association were continued for the remainder of the year, and the Central Association of Physics teachers became the Physics Section of the new organization.

The meetings of the Central Association of Science and Mathematics Teachers are held during the Thanksgiving recess of each year. It has been the policy of the Association not to centralize its officers but to see that they are taken from all parts of the contributing territory. Two meetings have been held in the Northwestern University Building in Chicago, one at Armour Institute, Chicago; two at Lewis Institute, Chicago; one at the Central Young Men's Christian Association Building, Chicago; one at the University of Chicago; one at McKinley High School, St. Louis, Mo.; one at the Englewood High School, Chicago; one at Technical High School, Cleveland; and one, at Northwestern University, Evanston. It has been the policy of the officers of the Association to hold the meetings in Chicago solely from the fact that Chicago being the most centrally located would be the most convenient place for the greatest number of those interested in the Association. The meetings have increased in interest and popularity from the beginning. Speakers from all parts of the country have been secured. The many phases of science and mathematical work have been studied and investigated. Exhaustive reports on the teaching of algebra, geometry, biology and earth science have been presented. A very complete report on the correlation of mathematics and physics in the secondary schools has been prepared and the Association is the father and promoter of the "New Movement in Physics Teaching." The American Federation of the Mathematical and Physical Sciences was first conceived by this Central Association.

The annual conventions have always been well attended by

people from all states in the central United States. Papers presented have been of the highest worth. The Association together with its official Journal, has accomplished more than any other agency in raising the standard of secondary science and mathematics teaching.

HISTORY OF THE BIOLOGICAL SCIENCE SECTION.

BY OTIS W. CALDWELL, .

University of Chicago.

In the early days of the existence of the Central Association of Science and Mathematics Teachers, those who met to form the section of biology came together, not primarily because they knew what they wanted to do, but because they felt that they should be doing something that they were not doing. An indefinite reason for organization, we may say, but very real nevertheless, and a reason more or less commonly existent with teachers of other high school sciences. In the evolution of the high school curriculum, an evolution which like others in nature occurs somewhat blindly, sciences gained a place in the program. Science had grown so rapidly, its wonders and its commonplaces were now organized into fairly definite, though constantly shifting systems, its laboratory and its method had emphasized a new way of securing evidence and establishing truth—hence the conclusion that science must appear in secondary school programs. Pre-eminently biology, by means of which we study evolution; which deals with life; with the individual's and the world's food problems; with the struggle to live and to prevent oneself from being the food of other things that are also struggling to live; it must be important for secondary education.

But with biological science established in the school system, the teacher found himself "holding the bag," the elusive snipe not to be seen, and those who had planned the game having gone on about their business. It long ago became evident to biology teachers that it is one thing, a comparatively easy thing indeed, to enthuse over the beautiful systems of science and the value of learning by the scientific method, but quite a different thing to take a jar of preserved earthworms or *Spirogyra* plants, or textbook earthworms and *Spirogyra* plants, a roomful of sixteen-year-old children, and a few pieces of apparatus, and secure results that might honestly be called educative in a constructive way. Consequently, biology teachers organized in order that they might

consider the problems that are involved in trying to use the biological sciences in educating secondary school children.

A study of the programs of the section reveals three types of activities: (1) the presentation of papers and discussions designed to inform teachers about recent advances in the sciences concerned; (2) papers and discussions upon specific aspects of the teacher's difficulties; (3) attempts, (a), to organize our courses in biological sciences, and (b), to organize a critical study of the best practices in securing efficiency in our biological work.

There can be no doubt of the value to all biology teachers of the first type of activity of the biological section. Discoveries in biology come so rapidly that it is well-nigh impossible to keep abreast of the sciences included. At best most teachers can take only occasional excursions out into the periphery of our knowledge where they may view the advancing horizon of biological discovery. These excursions need to be conducted by leaders who feel sufficiently at home in the newer regions of biological science to enable them to give us proper perspective. While this first activity of the section is not its most important one, it is one of great importance, and should be continued in future meetings of the section. We are fortunate in having available research men, who are pleased to present the results of their research to the section from time to time.

The second type of activity strikes very close to the teacher's daily work. Special phases of the work are discussed, as laboratory equipment, nature and quantity of laboratory work, notebooks, how to use the text-book, the preparation and use of charts and lantern slides, etc. The topic "Field Work" may be taken as illustration. One section was given to a discussion of this topic, divided into: Field work with trees, birds, common weeds, insects, and fishes; each sub-topic being presented by a teacher conspicuously successful in teaching the topic assigned to him. In this connection, it should be especially noted that these topics were presented by teachers who have experimented in teaching the topics in question, and they have given us the results of their

first-hand experiments just as truly as have the men who report their experiments in new fields of the science of their particular interest. The time is passing when the section cares to hear a speaker who has merely an untried theory regarding one of the problems of biology teaching.

The third type of activity is the most difficult to attack. It has produced some fundamental results, but it presents the most insistent demand for future work. We have decided upon underlying principles which, for a time at least, shall be the guides in determining our organization of courses and our practices in teaching. We have decided that biological courses in high school should deal with those materials that will best stimulate and develop intelligent efficiency on the part of people who are going to deal with every-day affairs. But it is not enough to decide upon a working fundamental basis. We must proceed to study critically all phases of our materials and practices, and we must compare such studies. In short we must take a scientific attitude, not an empiric attitude toward the teaching of science. The section has had reports upon some such studies, and they serve to show how very potent a few facts about science teaching may be. We need during the next few years to make special effort to secure carefully planned, scientifically accurate studies of the relative efficiency of various phases of our work. The section may profitably serve as a center for organizing such studies and for distributing their results. This task is large and extremely difficult. It will require much time and there will be discouragements. But it is the logical step if we are ever to be really scientific in our teaching of the biological sciences.

HISTORY OF THE EARTH SCIENCE SECTION.

BY JAMES H. SMITH,

Austin High School, Chicago.

In June, 1902, a business meeting of physics teachers was held at Chicago and the Central Association of Physics Teachers was organized. There was no program of papers.

At the first meeting of the association with a program, in November, 1902, Professor R. D. Salisbury read a paper on "Physics and Physiography." Thus the real work of the earth science section began at the birth of the association and before the section was organized. At the second meeting with a program, in April, 1903, the scope of the association was enlarged and the Central Association of Science and Mathematics Teachers was organized, with five sections as at present constituted. From that time to the present there has been an unbroken series of annual meetings with programs in each of the sections.

The purpose of this sketch is to point out the part which the earth science section has had in the progress of teaching these sciences. The energies of the section have been confined almost wholly to physiography, geography, including industrial and commercial, and those parts of geology, which contribute most directly to these.

Within the limitations just stated the topics discussed cover a wide range running out through many subjects. These may be briefly discussed under three heads, namely:

I. Laboratory and Field Work.

II. Life Response, and especially as this influences human life.

III. Educational Questions.

I. Laboratory and Field Work. The first program of the section, in 1902, put emphasis upon laboratory and field work as being absolutely essential to the proper study of physiography. From this high standard the section has never receded. From year to year problems pertaining to these have been presented and partially solved. With regard to field work advancement has been

slower than we might wish. Yet there has been progress, and in not a few schools field trips form the basis of a considerable part of the work. This is particularly true of schools in the rural districts. The number of schools requiring field trips should be greatly increased. In the large cities progress has been slower; and yet the problem is before us. The solving of this problem by a single school in a large city would be of enormous advantage to the subject in all cities.

In laboratory work the task was less difficult and greater advancement has been made. The equipment of the room, the kind and amount of material to be used and the arrangement of the laboratory program were all open questions ten years ago. Today there is substantial agreement upon the broader phases of these questions.

Through the papers, reports, and discussions at these meetings and those of other organizations, men have been prompted to write text-books and laboratory books leading step by step toward the ideals to be reached. Much yet remains to be done along this line. We have learned that the laboratory work in physiography is in many respects unlike that in the sciences of physics, chemistry, and biology. Physiographic processes are slow, often imperceptible. Our laboratory work consists of the application of principles to specific cases, the solution of problems, and the interpretations of maps. To learn to do these well is highly educative.

II. Life Response, and the human element in geography.

This topic was first presented to the section in 1903 in a paper by Dr. J. Paul Goode. Looked at from one point of view or another this topic has been upon many of our programs throughout the decade. How to treat it is still one of our most difficult problems. The discussion of it here and elsewhere has led to at least one conclusion, namely, that it is a topic that can no longer be ignored. Authors of text-books and of laboratory books have not been wholly successful in presenting, in a systematic way, the relations of life to the physiographic conditions. There is abundant material, but it is scattered and unorganized

and has not been reduced to teachable form. There has been improvement, however, in recent years, and this promises much for the future. It was in large part the lack of the life response in the method of presentation that led to the wave of criticism of physiography which spread over the country in 1909 and 1910. The problems were being worked out, but the educational public became impatient for results which did not appear, and in many places physiography was swept out of the course. As in chemistry jarring will often hasten the formation of a precipitate, so this jolt has hastened forward the evolution of physiography and has caused the crystallization of ideas which were but vaguely and slowly stirring in the magma before.

III. Educational Questions.

It is natural that a body of teachers should discuss the educational aspects of their subject. Such has been the case in the earth science section. There have been more papers, reports and discussions on the place of the earth sciences in the schools and on the methods of presenting the subjects than on any other part of the work. From "The Educational Value of Physiography" in 1904 to the report on "Fundamentals" in 1912, the section has heard and discussed many papers. Important committees have reported on "Coöperation in Securing Laboratory Materials"; "Fundamentals"; and on "Methods of Testing Results of Physiography Teaching." These reports have given many helpful suggestions and have assisted in eliminating awkward and inefficient methods.

The speakers at these conventions form a brilliant galaxy of the first magnitude, many of them being leaders in these sciences in this country. Among them we find the names of Atwood, Baber, Blount, Brigham, Cowles, Cox, Davis, Dodge, Ellis, Everly, Goode, Grant, Gregory, Henderson, Jefferson, Peet, Salisbury, Weller, Whitbeck, and many others. The colleges and the high schools have furnished exactly the same number of those who have presented papers; the normal schools have contributed two-thirds as many as either of the other two groups.

This in brief, is the history of the section. The future lies

before us with its promise of difficult situations and questions and of rewards for those who with courage and perseverance undertake the work which awaits them.

HISTORY OF THE MATHEMATICS SECTION.

BY WALTER W. HART,

University of Wisconsin, Madison.

The Mathematics Section was formed in the spring of 1903 when the Central Association was formally organized. From the start the association has had a loyal membership, and has taken an active and effective part in promoting reform in the teaching of secondary mathematics. Its influence has extended beyond its own membership to teachers in this and other parts of the country. Its success has been due to the policy of devoting its energy to the investigation of problems in the teaching of mathematics, through committees whose reports have been in each case characterized by a large amount of constructive proposal. These reports have been discussed at its annual meetings by the "committee of the whole," so that the whole Section has indeed contributed to the final products. A study of these reports gives a view of the efforts of the Mathematics Section; in fact, no better way exists for obtaining a broad view of recent opinion on the teaching of mathematics than to make a thorough study of these reports. A list of the reports, when they were presented, where they may be found, and a brief outline of each follows:

Committee on the Correlation of Mathematics and Physics. Presented 1903. Appendix to the Proceedings of the Second Annual Meeting of the C. A. S. & M. T. (25c, the Secretary of the Association).

After a preliminary criticism of the contents and methods of current teaching of mathematics, they pointed out as immediate possibilities the advantage of more concrete instruction, the need of correlation of "small bits" of mathematics and science without deranging current courses of study, the need of problems pertaining to the experiences and interests of the students, and

"Proceedings" refers to the annual volume of proceedings of the general association issued since 1908. Price 50c; the Secretary of the Association. S. S. & M., refers to the School Science and Mathematics, the official organ of the general association, 2059 East 72nd Place, Chicago, Ill.

the necessity of gaining time for emphasis upon the essentials of the courses by curtailment, elimination, and postponement of traditional material. As a *more remote possibility*, they proposed a thoroughgoing reorganization and unification of mathematics and related sciences. They gave some definite suggestions on the application of these proposals to the teaching of algebra and geometry.

Later reports of the Section may fairly be regarded as elaborations of ideas included in this first very suggestive and inspiring report.

Committee on the Teaching of Geometry in Secondary Schools. Presented, 1906, 1907. Proceedings, 1908:157.

The report contains recommendations regarding indefinables, congruence, terms, assumptions, definitions, figures, redundancies, pedagogy of geometry, relation of geometry and algebra, the use of history in geometry, mathematical recreations, applications of geometry, and a list of fundamental theorems of geometry. The second part of the report concerns the teaching of solid geometry.

The appendices, as printed in the 1908 Proceedings, contain interesting material on optical illusions, and an extensive bibliography. The report proved a distinct encouragement to teachers who wished to start their pupils in geometry in a less formal way, using a "large body of axioms" and "informal proofs," and who wished to use their judgment when it came to teaching such matters as the "incommensurables" and other equally difficult parts of the subject. The influence of this report is evident in the more recent report of the National Committee on Geometry, to the preparation of which the Mathematics Section contributed no small part through a number of its members.

Committee on the Teaching of Algebra in Secondary Schools. Presented, 1907, 1908. S. S. & M., 7:674. Report with discussions: Proceedings, 1908:188.

The need of a first year course and of a later course with different ideals is the basis of the report. For the former course, the report contains an exceedingly sane list of topics to be

omitted, an order of topics which offers many suggestions even to those who may not care to follow it in full, and an excellent discussion of problems and the sources from which they may be obtained. Some suggestions on the teaching of radicals deserve reiteration, until they shall have become established in the teaching practice of the country. Recommendations for the later course and remarks on the simultaneous teaching of arithmetic, algebra, and geometry complete the first report.

Committee on the Unification of Secondary Mathematics. Presented, 1908, 1909. First Report: S. S. & M., 1908:635, 676; also Proceedings, 1908:137. Second report: Proceedings, 1909:98.

When the Mathematics Section was formed, correlation and unification were proposed as ultimate aims. The report of this committee came after a number of years during which the persons interested in this phase of the teaching of mathematics were getting their bearings. The report presents in a brief manner some of the ideals, a suggestive program of an *oberrealschule*, a list of texts, a thoroughly conservative outline of a four years course which embodied the experiences of those who had been experimenting. The report showed that conservative unification was desirable and quite within the range of possibility of schools working under ordinary conditions.

Committee on Real Applied Problems in Geometry and Algebra. Presented, 1909, 1910. First report: S. S. & M., 9: 788; Proceedings, 1909:79. Second report: S. S. & M., 10:673; Proceedings, 1910:108.

The committee gave an analysis of the movement for real problems, calling attention to the pedagogical necessity of such a movement; they reported upon means taken to spread interest in the movement; they presented some problems that gave conclusive evidence that some of the fundamental facts of algebra and geometry are used in problems that have concrete setting; they gave an excellent list of books and magazines in which problems might conceivably be found; they called attention to the distinction between finding problems that are practical and

those that are practicable under class room conditions in secondary school—urging teachers to investigate the availability of the problems collected by using them. The second report classified the problems according to the part of the course in which they could be used; it included a review of the experiences of some teachers who had used the problems. The committee collected and arranged a considerable number of examples in a pamphlet which was sold at moderate cost to schools. Without any question, the committee served to give definiteness to the demand for and quest for practical problems.

The Mathematics Section has had prepared for it some reports upon more general aspects of the teaching of mathematics. Some of these reports must be regarded as incomplete at the present time. The following should be mentioned:

Committee on Fundamentals. Presented, 1910. Proceedings, 1910.

Committee on Uniform System of Notation in Mathematics and Science. Presented, 1910, 1911, 1912. Proceedings, 1910, 1911, 1912.

Committee on Results, Presented, 1910, 1911, 1912. Proceedings, 1910, 1911, 1912.

HISTORY OF THE PHYSICS SECTION.

BY WILLIS E. TOWER,

Englewood High School, Chicago.

The organization meeting of the Central Association of Physics Teachers, was held November 28 and 29, 1902, at Lewis Institute, Chicago. The "New Movement" in the teaching of physics was just stirring in the consciousness of live teachers of the subject. There was as yet no formal expression of the idea, but the necessity for an organization to ensure efficient coöperation was strongly felt.

The principal address of this first meeting was entitled, "The Revision of Physical Theory," by Professor Henry S. Carhart of the University of Michigan. This able and illuminating address is to be found in the Report of the First Regular Meeting of the Central Association of Physics Teachers. It was an appropriate introduction to the work of the association.

At the second meeting, held at Armour Institute, April 9-11, 1903, The Central Association of Physics Teachers was enlarged to become the Central Association of Science and Mathematics Teachers, the parent association forming the Physics Section of the new organization.

The programs of the physics section during the past ten years reflect the ideas current among progressive physics teachers during that time. The earlier programs emphasizing the "Teaching of *Physics*," the later ones the "*Teaching* of Physics." This radical change in the point of view has grown out of the "New Movement in the Teaching of Physics."

The emphasis upon subject matter in the earlier programs led to the preparation of the stimulating "Report of the Committee on the Correlation of Mathematics and Physics in Secondary Schools," published as an appendix to the Proceedings of the Second Meeting.

Other papers by individuals and committees have dealt out new ideas in science, with the relation of high school physics, to related courses in higher institutions, with new apparatus, reference books, etc.

Among these papers and reports worthy of special mention are:
"Proper Fitting of Physics Pupils for Engineering Schools,"
by President Carl Mees of Rose Polytechnic Institute.

"Correlation of High School and College Physics," Professor
R. A. Millikan, University of Chicago.

"Force and Torque," Professor Henry Crew, Northwestern
University.

"Radium and Radio Activity," Professor R. A. Millikan.

"Past and Present Theories in Electricity," Professor A. P.
Carman, University of Illinois.

"The Introduction of Meteorology into the Course of Instruc-
tion in Mathematics and Physics," Professor Cleveland Abbe,
U. S. Weather Bureau.

"The Aim of High School Physics Teaching," E. E. Burns,
Medill High School, Chicago.

"The Present Status of High School Physics," Professor Wm.
D. Henderson, University of Michigan.

"The Work of the United States Bureau of Standards," Pro-
fessor W. A. Noyes, University of Illinois.

"The Use of the Graphic Method in the Determination of
Physical Laws," Professor Lindley Pyle, Washington University,
St. Louis, Mo.

"Some Recent Determinations in Physics," Professor A. A.
Michelson, University of Chicago.

"The Elementary Charge in Electricity," Prof. R. A. Millikan,
University of Chicago.

"Physics in Technical Schools," Mr. V. D. Hawkins, Technical
High School, Cleveland, Ohio.

"On the Teaching of High School Physics," Prof. John O.
Reed, University of Michigan.

"Some Recent Physical Theory and Its Bearing on the Teach-
ing of the Elements of Physics," Professor A. P. Carman, Uni-
versity of Illinois.

At the Fifth Meeting of the Association, held Dec. 1-2, 1905,
the Physics Section appointed a committee to study and report
upon the present status of high school physics teaching and its

improvement. A consideration of one phase of the situation before the committee led to a symposium upon the Fundamentals in Physics. In the proceedings of the Eighth Meeting, pp. 115-132, are printed a number of papers of this symposium:

A series of reports and papers have been read before the Physics Section that are concerned with the *teaching of physics* as distinguished from the subject matter.

Among these are the following:

"Results of the New Movement in the Teaching of Physics," Geo. A. Works, pp. 129-138, Proceedings of the Eleventh Meeting.

"The Present Status of the New Movement in the Teaching of Physics," H. L. Terry, Madison, Wis., pp. 109-114, Eighth Proceedings.

The Physics Section has also shown a sustained interest in a First Year Course in General Science for the High School. The whole matter is admirably summarized in a paper by Professor Otis W. Caldwell of the University of Chicago: "The Course in General Elementary Science for the First Year of the High School," Ninth Proceedings, pp. 115-127.

"The Test of Efficiency in Teaching Physics," Professor W. C. Bagley, University of Illinois, Eleventh Proceedings, pp. 137-143.

"Co-operative School and Shop Course," Tenth Proceedings, pp. 121-124, Principal L. A. Fulwider, Freeport, Ill.

"The Teaching of Physics in Segregated Classes," Mr. Willis E. Tower, Englewood High School, Chicago, Tenth Proceedings, pp. 142-147; Eleventh Proceedings, pp. 144-151.

"Report of Committee on Efficiency Tests," Mr. F. E. Goodell, Des Moines, Iowa, Twelfth Proceedings.

In addition to the papers and Committee reports, a valuable and interesting feature of each meeting has been the Saturday afternoon trips made on the last day of the meetings to factories, manufacturing plants and places of especial technical interest.

The educational significance of physics for boys and girls has not as yet been clearly stated. The most effective conditions for teaching this subject are still a matter for discussion, while the preparation and testing of differentiated courses in household

and engineering physics for our girls and boys has been attempted in but few schools. In the light of the record made by the Physics Section it may be confidently predicted that these and other questions before teachers of physics will be aggressively and effectively handled at future meetings of the Association.

HISTORY OF THE CHEMISTRY SECTION.

BY DR. A. L. SMITH.

Englewood High School.

The *Chemistry Section* was organized at the Armour Institute Meeting of the Central Association of Physics Teachers, April 10, 1903.

After the organization was completed, Dr. Alexander Smith, of the University of Chicago, delivered an address, entitled, "The Pupil Before and After Taking Chemistry," this paper appears in *School Science and Mathematics*, Vol. III, p. 189.

Mr. Wm. Hoskins gave a paper on "What Shall the Preparatory School Give in the Way of Chemical Training?" See *School Science and Mathematics*, III, p. 338.

At the *next meeting* of the Section Prof. Wm. McPherson read a paper on "The Textbook in Elementary Chemistry." See *School Science and Mathematics*, IV, p. 1. Mr. H. N. Goddard's paper, "Should the Student be Directed to Emphasize One Point Only in Each Experiment, Or Should He Be Held Responsible for all Naturally Related Phenomena," appears in *School Science and Mathematics*, IV, p. 61.

At the *Fourth Meeting* Dr. N. H. McCoy presented a paper on "Some Recent Advances in Chemistry." This paper was followed by a discussion of the "Diminution in the Number of Students of Chemistry in the Secondary Schools, Its Causes and Remedies," by Messrs. Flynn, of the Hyde Park, Armstrong of the Englewood, and Wade of the Shortridge High Schools.

At the *Fifth Meeting* Dr. Londer W. Jones presented a paper on "Recent Advances in Chemical Knowledge," it appears in *School Science and Mathematics*, VI, p. 384.

Mr. F. J. Watson's "Equipment of a Modern Chemical Laboratory, in the Secondary School," is printed in *School Science and Mathematics*, VI, p. 182.

Prof. Louis Kahlenberg gave an interesting address on "Investigations of Osmosis," which with the address of Prof. Chas. T. Knipp on "New Theories of Matter in Relation to Chemical and

Physical Theory," was delivered before the joint session of Chemistry and Physics Sections.

The *Sixth Meeting* was held at the University of Chicago, Nov. 30 and Dec. 1, 1906. The Chemistry and Physics Sections held a joint session in the Ryerson Laboratory, Friday afternoon, at which Mr. F. T. Jones read a paper on "Standards in Science Teaching." School Science and Mathematics, VII, p. 122.

Mr. John F. Woodhull one on "Applications of Principles of Physical Science," School Science and Mathematics, VII, p. 83.

Prof. C. R. Mann reported on a "Course of Experiments in Physics," School Science and Mathematics, VII, p. 242.

Prof. Alexander Smith gave a paper on "The Point of View in Chemistry," School Science and Mathematics, VII, p. 128.

The *Seventh Meeting* occurred at the McKinley High School, St. Louis, Mo., Nov. 29 and 30, 1907. The sections of Chemistry and Physics held joint sessions at which the following papers were presented: Prof. W. A. Noyes, "The Work of the U. S. Bureau of Standards"; Mr. C. B. Curtis, "The Inter-relation of the Physical Sciences in the High School Course"; Prof. Lindley Pyle, "The Use of the Graphic Method in the Determination of Physical Laws"; Mr. Fredus N. Peters, "High School Chemistry, What and How Much," School Science and Mathematics, VIII, p. 107.

The *Eighth Meeting* took place at the Englewood High School, Chicago, Nov. 27 and 28, 1908.

Mr. E. B. Hutchins, Jr., presented the question, "How May Instruction in Chemistry be Made More Efficient," School Science, IX, p. 252. Mr. J. L. Welter's paper considered the "Difficulties to be Met in Secondary School Chemistry."

The *Ninth Meeting* was held at the University of Chicago, Nov. 26 and 27, 1909. Dr. Geo. B. Ashman read a paper on "What Should be Accomplished in a Year of Chemistry?"

Prof. N. A. DuBois discussed "Practical Technical Chemistry in Our Schools," School Science and Mathematics, X, p. 294.

Miss Jessie Caplin spoke of the "Simplifying the Sketching of Apparatus," School Science and Mathematics, X, p. 553.

Dr. Albert L. Smith presented several Quantitative Experiments.

The *Tenth Meeting* occurred at Cleveland, Nov. 25 and 26, 1910.

Mr. F. B. Wade's paper, "How I Attempt to Convey to High School Juniors the Meaning of a Chemical Formula," appeared in *School Science and Mathematics*, XI, p. 122.

Mr. Virgil C. Lohrs' on "Physical Chemistry, a Basis for Secondary School Chemistry," on page 20 of the same volume.

Mr. B. D. Quarrie's "Outline of the Manufacture of Iron and Steel," *School Science and Mathematics*, XI, p. 191, and Mr. Edward C. Holton's "The Manufacture of Paints and Pigments," *School Science and Mathematics*, XI, p. 425, are two of the best technical papers that have been presented to our section.

The *Eleventh Meeting*, Lewis Institute, Chicago, Dec. 1 and 2, 1911. Mr. L. A. Tonzalin discussed "The Electric Furnace for Steel" and his paper appears in *School Science and Mathematics*, XII, p. 177.

Mr. John C. Hessler's paper on "The Correlation of High School Chemistry and Daily Life" may be read in *School Science and Mathematics*, XII, p. 290. Mr. C. A. Vallance's "Inspection of Chemical Industries by Students in the Secondary Schools," is published in the same volume, p. 381. Mr. W. R. Smith spoke on the "Night School Work in Chemistry."

Mr. F. B. Emery, Central Y. M. C. A., Chicago, considered "The Needs of the Community in Chemical Education as Seen in the Y. M. C. A. Educational Work."

The *Twelfth Meeting* was held at the Northwestern University in Evanston, Nov. 29 and 30, 1912. The minutes of the section appear in *School Science and Mathematics*, XIII, p. 170. The address of Dr. H. N. McCoy on "Recent Advances in Radio Activity," was given before the joint meeting of the Chemical and Physical Sections.

Other papers read before the Chemistry Section were F. E. Goodell, "Some Chemical Experiments not in the Manual"; A. C. Norris, "Experimental Work in Chemistry That Can be Done at

Home by Secondary School Pupils"; E. F. Downey, "A Motive for Experimentation in Secondary School Chemistry."

A committee of three, consisting of Mr. H. R. Smith, Mr. A. C. Norris and Mr. C. M. Wirick, were appointed to perfect a list of chemistry experiments concerning daily problems and publish them for members of this section. This committee is at work and we may expect a good report from them. All live teachers of chemistry who are within reach of the meetings of this section, owe it to themselves and to their fellows to become one with us, help and be helped. "In union there is strength."

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